



GOVERNMENT OF INDIA
MINISTRY OF TOURISM AND CIVIL AVIATION
 (COMMISSION OF RAILWAY SAFETY)

**RAILWAY ACCIDENT
 INVESTIGATION**



**Report
 ON
 Derailment
 OF
 NO. 52 UP KAZIPET-MADRAS EXPRESS
 Between
 Duggirala & Tenali Stations,
 (SOUTH CENTRAL RAILWAY)
 ON
 2nd November, 1968**

1971

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CORRIGENDUM

<u>Page No.</u>	<u>Para No.</u>	<u>Line No.</u>	<u>For</u>	<u>Read</u>
2	-	1	Delete the words 'No. 87/'	
3	5(1)	1	Delete ';' at the end of the line.	
3	6(1)	2	add tion	addition.
4	11(3)	1	Delete '..' after 'Aspect'.	
5	17(4)	4	Opned.	Opined
7	27(2)	4	we	were
8	35	2-3	expecte- ed	expected
10	41(c)(2)	2	subjet	subject
11	1'under Incidental Observations'	1	Delete '..' between 'No.' and 'emergency	



SUMMARY

1. Date 2nd November 1968.
2. Time About 07-45 hours.
3. Railway South Central.
4. Gauge Broad (5'-6").
5. Location Between Duggirala and Tenali stations.
6. Nature of accident Derailment.
7. Train involved No. 52 Up "Kazipet—Madras Express".
8. Consisting of Steam Engine hauling 7 bogie passenger coaches.
9. Engine No. Steam Locomotive No. WP 7722.
10. Estimated speed About 80 Km. p.h.
11. Method of working Absolute Block System with Tokenless Block working
12. Gradient 1 in 200 descending
13. Alignment Straight.
14. Weather Clear.
15. Casualties 1 passenger sustained a grievous injury.
16. Cause Failure of one of the split pins securing the dynamo pin of the dynamo of the 1st coach, which as a result, fell off while the train was on the run, dislodged one of the vacuum chambers of the 5th coach, and formed an obstruction.
17. Parties held responsible Responsibility cannot be fixed on any individual.

GOVERNMENT OF INDIA

MINISTRY OF TOURISM AND CIVIL AVIATION

(COMMISSION OF RAILWAY SAFETY)

No. 87/

Dated : 9th January, 1939.

From

The Additional Commissioner of Railway Safety, Southern Circle, Bangalore.

To

The Secretary to the Government of India, Ministry of Tourism & Civil Aviation, New Delhi.

Through

The Commissioner of Railway Safety, Lucknow.

Sir,

In accordance with Rule 10 of the Railway Board's Notification No. 59-TTV/42/1 dated the 11th April 1966 I have the honour to report the result of my Inquiry into the derailment of No. 52 Up "Kazipet-Madras Express" that occurred on the morning of the 2nd November, 1968 between Duggirala and Tenali stations on the South Central Railway's East-Coast Main Line.

2. Inspection and Inquiry.—The site of the accident was inspected by me on the morning of the 9th November 1968 in company with the concerned Divisional Officers. The Inquiry was commenced at Vijayawada the same day and concluded on the 10th November 1968, the following Administrative Railway Officers being present at the same :

- (i) Shri R. Srinivasan, Divisional Superintendent, Vijayawada;
- (ii) Shri G. S. Rajan, Transportation Superintendent, (Safety), Secunderabad.

The Civil Authorities and the Police were advised about the Inquiry but were neither present nor represented at the same.

Further evidence was recorded at Secunderabad on the 18th and 19th November, 1968, and at Madras on the 28th November, 1968.

[NOTE :—The terms "front", "rear", "leading", "trailing", "left", and "right", where used, are with reference to the direction of motion of No. 52 Up Express.]

I. PREAMBLE

3. Brief Description of the accident.—No. 52 Up Express left Vijayawada on the 2nd November at 03-55 hours. It was stopped at the next station, Kistna Canal, from 07-08 hours to 07-26 hours to cross a goods train. After leaving Kistna Canal station it picked up speed, but shortly after passing Duggirala station the rear pair of wheels of the rear bogie of the 5th coach derailed, and the train came to an abrupt stop at Km. 404/7-8 at about 07-47 hours, the vacuum having been abruptly destroyed.

4. Casualties.—As a result of the accident one passenger was injured. He sustained an injury on his right little finger which proved to be of a grievous nature.

5. Composition of the Train.—No. 52 Up Express consisted of 7 bogie coaches hauled by a WP Locomotive. The Train was marshalled in the following order :

Engine No. WP 7722 ;

1st Coach CR TLR 6074	..	Third Class, Luggage and Brakevan ;
2nd Coach SR FCT 1233	..	First Class with Coupe, and Third Class ;
3rd Coach SR GSCG 5493	..	Second Class Sleeping Car Two tier ;
4th Coach CR WGTCNY 6682		Third Class Sleeping Car Three tier with accommodation for Ladies
5th Coach SR WFC 2947	..	First Class with Coupe ;
6th Coach SR FCT 1226	..	First Class with Coupe and Third Class ;
7th Coach SCR TLR 3495	..	Third Class Luggage and Brakevan.

The train was fully vacuum-braked, and its length and weight were approximately 594 ft. and 450; tonnes respectively (inclusive of the engine).

All the coaches had steel bodies of the integral type.

The engine had a speed indicator of the "VDO" type which was in working order, but did not have a speed recorder.

6. *Damage to the Rolling Stock and Permanent Way* —(i) The dynamo of the 1st coach and the vacuum chamber of the 5th coach fell off and were badly damaged. In addition, the undergear of all the 7 coaches were damaged to varying degrees. There was no damage to the locomotive.

(ii) The derailed vehicle travelled for a distance of about 2,280 ft. As a result a number of CST-9 plates and tie-bars were damaged.

(iii) The total cost of damage was estimated approximately as follows :—

Approximate Cost		
Locomotive	..	.. Nil
<i>Rolling Stock</i>	..	..
(i) Mechanical	..	.. Rs. 3,000.
(ii) Electrical	..	.. Rs. 6,200.
Permanent Way	..	.. Rs. 9,000. 
Total	..	<u>Rs. 18,200</u>

7. *Number of Passengers* :—The seating capacity of No. 52 Up Express was 362, and there were about 250 passengers in the train at the time.

8. *Weather conditions* :—It was a clear, sunny morning, and visibility was good.

II. RELIEF MEASURES

9. *First-aid and Medical assistance* :—Only one passenger sustained an injury on his right little finger. First aid was rendered initially by Military Personnel travelling in the train and then by the Guard of the train. He was again given medical attention by the Railway Assistant Medical Officer at Tenali as soon as the train arrived at Tenali. A little later, the Divisional Medical Officer, Vijayawada, and the Assistant Medical Officer, Vijayawada, also reached Tenali by road ambulance, and the injured passenger was taken to the Railway Hospital at Vijayawada and admitted therein.

10. *Restoration of communications* :—3 Railway Officers viz., Assistant Mechanical Engineer (Loco), Assistant Operating Superintendent (General) and Assistant Signal & Telecommunication Engineer, Vijayawada, were travelling in the train at the time. After making enquiries from the passengers regarding injuries, and after examining the track damage and the damage to the rolling stock etc., the passengers of the last 3 coaches were accommodated in the first 4 coaches, and the engine with these 4 coaches left the accident spot for Tenali at 09-15 hours. Later these passengers changed at Tenali into No. 37 Up "Howrah-Madras Janta Express", to which 4 additional coaches were attached.

The Divisional Officers arrived at the site at about 10-15 hours, and a light engine with men and material from Tenali at 10-17 hours. The derailed coach was then re-railed with ramps at 10-27 hours, and the track was certified fit at 10-50 hours with a speed of 30 Km. p. h.

III. LOCAL CONDITIONS

11. *Description of the site and method of working* :—(i) The derailment occurred at Km. 405/3-4 between Duggirala and Tenali stations. The Divisional Headquarters and Control Offices are located at Vijayawada.

(ii) The kilometrage (reckoned from Madras Central) of the various places mentioned in the report is detailed below :—

	Kms.
Tenali	397
Kolakalur (Flag station)	403
Duggirala	407
Kistna Canal	424
Vijayawada	429
Kazipet	648
Wardha	1,915
Itarsi	1,390
New Delhi	2,183

(iii) The section from Tenali to Kistna Canal is a single line section with Multiple-Aspect, Upper Quadrant Signalling, worked on the Absolute Block System with tokenless block working. Trains from Madras are termed Down trains and those proceeding towards Madras Up trains.

(iv) The stretch from Duggirala to Kolakalur is straight. The derailment occurred on a descending gradient of 1 in 200 on a low bank about 3 feet high. The track consists of 52 kg. rails, laid in 1963, with CST-9 sleepers and wooden joint sleepers to density N+6, and is fully stone ballasted.

12. *Permissible speeds* : The maximum permissible speed on the Kistna Canal Tenali section is 100 Km. p.h. The booked speed of No. 52 Up Express is 80 Km. p.h.

There were no permanent or temporary speed restrictions in force between Duggirala and Tenali at the time.

IV. SUMMARY OF EVIDENCE

13. *Driver of No. 52 Up Express, Shri T. Deekshapathy* said that after passing the Down Distant Signal of Duggirala he noticed a sudden drop in the vacuum to zero, and so closed the regulator, and applied the brakes.

Immediately after the train came to a stop he examined the engine and found everything in order, and all the brake blocks intact on the engine and tender wheels. Other items noted by him at the time were as detailed below :—

- (i) the hose pipes connecting the 1st and 2nd coaches were disconnected and the hose pipes at a number of other points were also disconnected;
- (ii) the brake gear of the T.L.R. next to the engine was damaged;
- (iii) the brake gear of the 5th coach was also damaged, and the rear pair of wheels of the trailing bogies of this coach had derailed.

The speed of the train at the time was 80-85 Km. p.h., and the train stopped at 07-48 hours.

14. *First Fireman of No. 25 Up Express, Shri T. Kondaiah* said that immediately after the accident he checked the engine and saw that none of the brake block on the engine or tender wheel was missing or damaged.

15. *Guard of No. 52 Up Express Shri V. Sikkhmany* said that after passing Duggirala he felt a jerk, and saw that the vacuum had dropped to zero. The train came to a stop at 07-47 hours.

Getting down from the rear most T.L.R. and walking towards the front he saw that the rear most pair of wheels of Coach No. WFC 2947 had derailed. There was a damaged steel box between the rails under the coach that had derailed, and he also saw a cylinder by the side of the track.

Just before it stopped the speed of the train was about 80 Km. p.h.

He had taken over the train as Chief Guard at Vijayawada that morning and had no complaints regarding the electrical fittings on the train.

16. *Brakesman of No. 52 Up Express, Shri I. David* said that he had been travelling in the 1st T.L.R. next to the engine from Vijayawada. After the train passed the Down Distant Signal of Duggirala, he heard an unusual sound and felt a jerk. The vacuum gauge in this brake-van then dropped to zero, and the train stopped at 07-48 hours.

Coming to the rear of the train after it stopped he saw that the rearmost pair of wheels of the 5th coach had derailed. He also saw a dynamo lying by the side of the track below the cess and a vacuum chamber.

[Note : The witness later identified the armature as what he had actually seen below the cess and had termed the dynamo.]

17. *Assistant Mechanical Engineer (Loco), Vijayawada, Shri F. D'Cruz* said that he had been travelling in the 5th coach of the train from Vijayawada. After passing Duggirala there was a sudden application of the brakes, and a feeling as if the coach in which he was travelling had derailed, the train stopped at 07-48 hours.

On getting down he saw that only the rear pair of wheels of the rear bogie of the coach in which he had been travelling had derailed to the left. Proceeding to the rear he first saw a crushed vacuum chamber at Km. 405/2-3 to the left of the track. A little further, at Km. 405/3, the body of a dynamo was lying to the left off the cess, and at Km. 405/5 there was an armature on the cess to the left. There were also pieces of the dynamo body scattered at different locations in a broken condition, and this convinced him that the derailment had been caused by some obstruction on the track—presumably either by the dynamo or the vacuum chamber having dropped off the train and been run over.

Checking the train, he saw that the damaged vacuum chamber belonged to the 5th coach (No. 2947), and the dynamo had dropped off the 1st coach (No. 6074). It was obvious that the dynamo had dropped off first, damaged the brake gear, and dislodged the vacuum chamber of the 5th coach. The vacuum hose pipes connecting the 1st and 2nd coaches were disconnected, and so also were the hose pipes between the 5th and 6th coaches and the 6th and 7th coaches, that of the 5th coach having been wrenched off and lying between the track. There had been no parting, but the spare coupling between the 1st and 2nd coaches had come off the hook.

By 08-15 hours approximately he had made an examination of the undergear of the 1st coach—with particular reference to the suspension arrangements of the dynamo that had dropped off. He did not see the dynamo pin, and presumed that it had fallen off. The safety chains were hanging complete with 'U' shackles, and from his examination he opned that the safety chains had not been attached after about the 10th October.

18. *Assistant Signal & Telecommunication Engineer, Vijayawada, Shri K.S. Ramanujam* said that he had been travelling in the leading compartment of the 5th coach of the train (No. 2947) from Vijayawada along with the Assistant Mechanical Engineer (Loco), Vijayawada and the Assistant Operating Superintendent (General), Vijayawada. After passing the second Down Sighting Board of Duggirala station he heard ballast being thrown up under the coach, and his coach derailed; the speed of the train at the time was about 80 Km. p.h.

The train stopped at about 07-48 hours, and, after alighting, he saw that the dynamo of the leading coach (No. 6074) had fallen off, damaged the under-frames of the coaches, and subsequently brought about the derailment of the rear pair of wheels of the rear bogie of the coach in which he was travelling (No. 2947). The vacuum chamber of this coach (No. 2947) had also been knocked off in consequence and damaged.

It was about 08-40 or 08-45 hours when he first discovered that the dynamo had fallen off from the 1st coach, and at that time the dynamo pin was not in the suspension bracket nor had he seen it at any time.

19. *Assistant Operating Superintendent (General), Vijayawada, Shri S. Rangachari* said that he was travelling in the front compartment of the 5th coach (No. 2947) of the train along with the Assistant Mechanical Engineer (Loco), Vijayawada and the Assistant Signal & Telecommunication Engineer, Vijayawada. Shortly after passing Duggirala he felt the sudden application of brakes and jolting of the coach, and the train stopped at 07-48 hours.

Going to the rear he saw a vacuum chamber twisted out of shape lying to the left outside the track at Km. 405/2-3. Further on, at Km. 405/3, a dynamo body was found to the left a little distance from the track lying in a water-logged field. The armature of the dynamo was seen at Km. 405/5. Apart from the vacuum chamber, the dynamo body, and the armature, there were a number of small pieces of broken parts lying in between the track. He noted that the vacuum chamber of the 5th coach (No. 2947) had dropped off, and the dynamo from the 1st coach (No. 6074) was also missing.

He considered that the dynamo had fallen off the 1st coach, damaged the under gear of the other coaches and knocked off the vacuum chamber of the 5th coach. The dynamo and the vacuum chamber, after falling off, must have derailed the rear pair of wheels of the 5th coach.

20. *Pilot Officer Iqbal Singh*, who was travelling in Coach No. 2947 from Delhi stated that a little before Itarsi he had noticed an unusual sound from under-neath the coach as if "some plate of the wheel" had worked loose. The sound was very loud when the train started, but diminished when the speed increased. He drew the attention of the Coach Attendant to this, and, at Itarsi, a Fitter checked the coach, and informed him that there was nothing wrong.

Near Tenali he experienced a jolt, and he immediately pulled the alarm chain but the train did not stop for a furlong or so. After the train stopped he got down and saw that the same set of wheels, about which he had complained, had derailed.

21. *Amenity Electrical Fitter on No. 52 Up Express Shri V. Kaliaperumal* said that he had accompanied this rake as Amenity Electrical Fitter from Madras Central on the 29th October, reaching New Delhi on the 31st October. The rake left New Delhi, as No. 22 Express, on the evening of the 31st October, and the train splitting up at Kazipet early on the 2nd November, continued as No. 52 Up Express and met with the accident near Duggirala station the same morning. He had been travelling in the last coach (No. 3495) when the accident occurred.

Before leaving Madras Central on the 29th October he did not check whether Coach No. 6074 had the safety chains attached to the dynamo, nor did he check whether the alignment adjustment bracket was fitted to the dynamo. He also did not check these items anywhere on the run to New Delhi and back, nor did he draw the attention of the staff at New Delhi or any other staff to such deficiencies; in fact, he normally did not check such items.

After the accident, when he checked the train, he found that the dynamo on the 1st coach was missing, and under this coach the dynamo belt was hanging on the axle pulley and the dynamo pin was hanging from one of the brackets; prior to this, going to the rear of the train, he had seen the armature and dynamo body lying by the side of the track, and the crushed vacuum chamber between the rails. He took the dynamo belt and the dynamo pin to Madras and had brought it back to be tendered as evidence.

His colleague Shri Chettiar had worked together with him on the train; they took their rest while the train was on the run, and worked together when the train stopped.

22. *Amenity Electrical Fitter on No. 52 Up Express, Shri D.P. Chettiar* confirmed that he had travelled with this rake from Madras Central on the 29th October and from New Delhi on the 31st October.

On the 1st November there had been some trouble with coach No. 6074 while the train was on the run after passing Wardha; smoke was seen coming out from the dynamo, and he had attended to it. At Kazipet again they had checked and found that the dynamo was all right, and the inspection covers intact.

Before leaving Madras Central he had seen that the safety chains were attached to the dynamo of this coach (No. 6074) but had not noticed whether the adjusting bracket was attached to the dynamo or not. When checking at Kazipet also he had seen that the safety chains were attached to the dynamo of this coach, but at Vijayawada, although he had looked at this dynamo, he had not particularly noted the safety chains.

After the accident occurred his colleague and he went to the rear and saw the armature, the dynamo, casing, and the vacuum chamber which had dropped off. Going forward and checking the train, they saw that the dynamo of the 1st coach (No. 6074) had fallen off. Its two safety chains were hanging from the undergear of this coach, one with the 'U' shackle at the end, and the other, which was shorter, without the 'U' shackle; he, therefore, had presumed that the bolt attaching the long safety chain to the dynamo had broken or fallen off, and the link at the end of the other safety chain had broken. The dynamo pin was hanging, suspended from the outer hole of the suspension bracket. At Tenali, on their return trip to Madras, he had shown this dynamo pin to the Electrician.

23. *Electrician, Shri S. Sudalaimuthu* confirmed that the Amenity Electrical Fitter Shri D.P. Chettiar had shown him a dynamo pin when he met him at Tenali station on the 2nd November. Shri Chettiar had told him that this dynamo pin had been removed by him in connection with the accident to No. 52 Up Express and that he wanted to preserve it as evidence. The dynamo pin shown to him appeared to be shining and one end did not have a projection like a split pin sticking out from it.

23. *Professional Electrical Engineer, Vijayawada, Shri V. Subramanian* said that he examined the 7 coaches of the train at Tenali at about 14-00 hours on the day of the accident. With regard to coach No. 6074, dynamo safety chains of equal length were hanging from the underframe with the end 'U' shackles without bolts attached. The dynamo adjusting bracket and dynamo pin were also missing from this coach No. 6074. In his opinion the dynamo safety chains and the adjusting bracket of coach No. 6074 could not have been fastened to the dynamo on the entire trip from Madras Central to New Delhi and back.

The safety chains and the adjusting brackets were intact and attached to their respective dynamos on the remaining coaches of the train.

25. *Professional Mechanical Engineer (C&W), Vijayawada, Shri M. C. Das* said that he examined the 7 coaches of the No. 52 Up Express at about 14-00 hours on the 2nd November at Tenali. All the safety chains were attached to the dynamos except on TLR 6074 where the safety chains were hanging from the brackets completely without 'U' shackles but unattached. The adjusting bracket was also not fitted for the dynamo of this coach.

In his opinion the dynamo of this coach, No. 6074, had been running unattached to safety chains for a period of about 10 days.

26. *Lighting Fitter, Madras Central, Shri D. Shanmugham* said that he had examined the rake of No. 51 Down Express on the Pit Line at Madras Central before it left on the 29th October. The safety chains were attached to the dynamo of this coach, but he had not recorded it in his hand book; orders had been issued subsequently by his Foreman that in future it should be recorded as to whether safety chains were attached to the dynamo of a coach or not. He did not remember whether the adjusting bracket was fitted to this coach or not when it left Madras Central on the 29th October.

He always ensured that safety chains were attached to dynamos before he passed any coaches.

27. *Electric Examiner, New Delhi, Shri Mohan Lal* said that he checked Coach No. 6074 on the Pit Line at New Delhi on the 31st October. He found that the dynamo field positive fuse was burnt due to the dynamo field strip being loose and having been burnt. This he set right. He also cleaned the armature of the dynamo which was very dirty. He did not recall the safety attachment of the dynamo of this coach, but since nothing had been recorded in his diary it must have been properly attached.

About 50 percent of coaches that come out from 'Shops' do not have safety chains for the dynamos, and safety chains are not kept by them in stock. When safety chains were found hanging unattached to a dynamo it was his practice to obtain bolts from stock and fasten them; if the bolts were not available, they got them from the Mechanical Department, but no safety chains were kept in stock. The practice was, however, not to mark a coach 'sick' if the safety chains were missing.

For this particular coach, since there was no entry in his diary to the contrary, the dynamo adjusting bracket must have been fitted. Further, since he had recorded in his diary that the dynamo had been checked and was in order, the split pins connecting the dynamo pin must also have been present and in order.

28. *Electric Examiner, New Delhi, Shri Chunilal* said that he was generally in supervisory charge, and that Shri Mohan Lal, Electric Examiner, had been deputed to examine this rake. On that particular date his attention to any particular defect on any of the coaches of this train.

Some years ago (about 1961) there were orders that a coach should not be allowed to run if safety chains were not attached to its dynamo. In consequence several coaches were marked 'sick', and after that these orders were cancelled, and they were now not particular about the attachment of safety chains to dynamo before releasing a coach as fit to run. If, however, safety chains were found hanging from the inside of a coach, bolts were provided to fasten the same to the dynamo before the coach was released; they have such bolts in stock. Regarding dynamo adjusting brackets, he had never noticed one missing before from the dynamo of any coach, and they did not keep such items in stock for replacement. He was unable to say whether such deficiency would necessitate the marking of a coach 'sick' because he had not come across such a case.

29. *Train Lighting Fitter, New Delhi, Shri Hans Raj* said that he usually maintained Nos. 15/16 Grand Trunk Expresses. Some years back there had been a circular to the effect that a coach should be marked 'sick' if the safety chains were not attached to its dynamo. In compliance with this circular he had marked 6 coaches 'sick', and after this the orders were relaxed, and they were allowed to permit a coach to run even if the safety chains were not attached to the dynamo, as they had insufficient stock of safety chains. The present practice also was to permit a coach to proceed even if the safety chains were not attached to its dynamo, after informing his superior verbally. If safety chains were available on the coach, however, they were secured to the dynamo by means of bolts.

30. *Train Lighting Fitter Trainee, Kazipet, Shri K. Prahaladha Rao* said that he personally checked the dynamo of coach No. 6074 on the 2nd November, but did not note whether the safety chains were attached to it, as they usually did not check safety chain attachments and there were no orders that this should be done. With regard to trains originating from Kazipet, however, they always ensured that a coach was sent out with the safety chains attached to the dynamo, failing which the coach was marked 'sick'.

31. *Electrician, Kazipet, Shri S. R. Narasimha* said that the practice was to permit a coach on a through train to continue on its journey without the safety chain attachment to the dynamo if the split pins fastening the dynamo pin were in tact. In the case of originating trains, however, a coach was not allowed to commence its journey without the safety chains attachment to the dynamo.

No spare safety chains were kept in stock at Kazipet.

32. *Train Lighting Fitter, Vijayawada, Shri A. Francis* said that he checked the coach No. 6074 at Vijayawada on the morning of the 2nd November, and recorded that the dynamo was warm. He saw the safety chains hanging but did not notice whether they were attached to the dynamo of this coach (No. 6074) or not.

The general practice was that if safety chains were found hanging they should be attached by bolts to the dynamo after obtaining the bolts from the train examining staff; he, however, had never done this.

33. *Electrician, Vijayawada, Shri B. Narayananamurthy* said that the staff under him who checked the train had told him before it left that everything was all right.

The general procedure was that when a coach on a through train was seen to have its safety chain hanging unattached to the dynamo, bolts were supplied to make the attachment, but if the chains were broken or deficient the coach was allowed to proceed, as they had no spare chains for replacement.

He had not come across a case where the safety chains had been found hanging and intact but unattached to their dynamo.

V. OBSERVATIONS

34. *The Coaches*—The rake was examined by me at Vijayawada on the 9th and 10th November. The undergear of all the coaches was damaged to varying degrees, the dynamo from the 1st coach (No. 6074) was missing, and so was one of the vacuum chambers of the 5th coach (No. 2947). The flanges of the rearmost pair of wheels of the 5th coach (No. 2947) were deeply scored round the circumference—obviously the result of the derailment.

It was particularly noted that the safety chains (for attachment to the dynamo under the 1st coach) were intact, approximately of equal length, and complete with one 'U' shackle. From the condition of the eye holes of the 'U' shackles it was also evident that these 'U' shackles had not been attached to the dynamo for a considerable period of time—about 2 weeks at least at a rough guess.

35. *The damaged dynamo*—This was also examined at Vijayawada on the 9th and 10th November. The casing was broken and the armature had separated from the same. The damage was such as might be expected if a dynamo had fallen off a running train at speed and been struck by the undergear of passing coaches and also possibly mounted by one or more wheels. It also appeared that the adjusting bracket for this dynamo had not been attached to the same for a considerable length of time—probably about 2 weeks at least. A 'U' shackle had been attached to the dynamo casing which had broken off but had been recovered at the site. This 'U' shackle should have engaged with the 'U' shackle of one of the safety chains, but an examination of the same confirmed that it had not been attached to the safety chain for quite a considerable period of time.

The dynamo pin was produced by the Amenity Electrical Fitters of the train, Shri V. Kaliaperumal and Shri D.P. Chettiar. The split pin at one end of this dynamo pin was intact, but the split pin at the other end had sheared off, the sheared portion of the split pin remaining inside that end of the dynamo pin.

36. *The damaged vacuum chamber*—This was badly crushed out of shape, but it could not be stated definitely as to whether any wheels had actually ridden over it after it had dropped off.

37. *Condition of coaches of No. 71 Down "Madras-Vijayawada Passenger" on the 9th November 1968*—This train was echecked at Duggirala station on the morning of the 9th November along with the Divisional Electrical Engineer, Vijayawada, and the Divisional Mechanical Engincer, Vijayawada. Out of 7 bogie coaches on the train (which included an Inspection Carriage) 2 coaches (Nos. SR. GT. 3819 and SR. TLR. 4634) each had its 2 safety chains intact but only one attached to its dynamo, and 1 coach (No. SCR. GT. 3030) had the 2 safety chains intact but not attached to the dynamo. This train had started from Madras Central the previous evening at 16-40 hours.

VI. DISCUSSION

38. *Time of the derailment*—The time at which the train stopped has been variously given as follows :—

(a) Driver and Guard of No. 52 Up Express	07-47 hours.
(b) Brakesman of No. 52 Up Express, Assistant Mechanical Engineer (Loco). Vijayawada, Assistant Signal & Tele-communication Engineer, Vijayawada and Assistant Operating Superintendent (General), Vijayawada	07-48 hours.
(c) Travelling Ticket Examiner on No. 52 Up Express	07-40 hours.

The train passed through Duggirala station at 07-43 hours, and the distance from this station to the point of derailment is approximately 2 Kms. The speed of the train, according to the Guard and Driver, was about 80 Km ph. and it would have taken about 1½ minutes for it to have travelled this distance. The train actually stopped a little less than ½ mile from the point of initial derailment, and it is probable that it took about 2 minutes to stop.

It is, therefore, probable that the derailment occurred at about 07-45 hours.

39. *Cause of the derailment*—The evidence is absolutely clear on the following points :—

- (a) The train came to an abrupt stop shortly after the 5th coach derailed—it was seen that the derailed wheels travelled a distance of 2,279"—3" only;
- (b) the dynamo from the 1st coach was missing, and the dymano safety chains of this coach were intact complete with end 'U' shackles;
- (c) the undergear of all the coaches were damaged;
- (d) one of the vacuum chambers of the 5th coach was missing;
- (e) a damaged dymano casing, a damaged armature (obviously belonging to this same damaged dymano casing) and a damaged vacuum chamber were found at the site.

I have no doubt, therefore, that the dymano first fell off from the 1st coach, damaged the undergear of all the coaches passing over it, dislodged the vacuum chamber from the 5th coach, and the resultant damaged parts brought about the derailment of the rearmost pair of wheels of the 5th coach.

Here it may also be mentioned that the vacuum chamber of the 5th coach should have had a wooden arc shaped wedge on the top, but this wooden arc shaped wedge could not be found after the derailment. If this was missing—and it seems as if it was indeed missing at the time—the vacuum chamber in question would not have been very firmly fixed to the underframe, and this might possibly explain the reason as to why only this vacuum chamber on the train was dislodged. It might also explain the unusual sound noted by Pilot Officer Iqbal Singh (Vide para-20 above), because nothing else was found wrong with this coach which could possibly have led to its derailment.

40. *Cause of the dynamo falling off the 1st Coach*—An examination of the dynamo pin produced by the Amenity Electrical Fitters on the train clearly showed that one of the split pins had sheared, and this must have resulted in the dynamo pin working loose, and dynamo itself falling off—from paras 17,24,25 and 35 above I am satisfied that the safety chains were not attached to the dynamo at the time. It is also probable that the shearing of the split pin was brought about by undue lateral play of the dynamo which might possibly have been aggravated by the absence of the dynamo adjusting bracket—from paras 24, 25 and 35 above I am satisfied that this adjusting bracket had also not been attached.

41. *Responsibility for the dynamo becoming detached and falling off the 1st coach*—(a) The primary cause of the dynamo becoming detached was the shearing of the split pin passing through the inner end of the dynamo pin. This split pin could only have been examined by some one getting under the coach, and such an

examination could not be expected from way-side electrical staff while the train was on the run from New Delhi up to the time of the derailment. It also cannot be established as to what was the condition of the split pin before the train left New Delhi on the commencement of its run, and, therefore, individual responsibility for the failure of the split pin cannot be fixed.

(b) As mentioned in para—40 above, it is considered probable that the shearing of this split pin was brought about by undue lateral play of the dynamo which might possibly have been aggravated by the absence of the dynamo adjusting bracket. It was apparent, from an examination of the parts, that this dynamo adjusting bracket had also not been attached for quite some time, and, to my mind, the coach must have started from Madras on the 29th October without this adjusting bracket fixed. For this lapse, therefore, responsibility must be borne by the primary maintenance depot electrical staff (at Madras Central) and the secondary maintenance depot electrical staff (at New Delhi), and the Southern Railway and Northern Railway Administrations should take this up with staff concerned.

(c) With regard to the safety chains not being attached to the dynamo, I am afraid I do not accept the statement of the Train Lighting Fitter, Madras Central, Shri D. Shanmugam (para -26) to the effect that the safety chains were attached to the dynamo of the 1st coach before it left Madras Central on the 29th October. An examination clearly showed that these had not been attached to the dynamo for a considerable period of time, and this was endorsed by the Assistant Mechanical Engineer (Loco), Vijayawada, who was travelling in the train at the time, and the Divisional Electrical Engineer, Vijayawada and Divisional Mechanical Engineer, Vijayawada, who examined the coach and the various parts concerned the same day shortly after the accident occurred—vide paras 17, 24 and 25 above. However, the safety chains might be called a “second line of defence”, and it is apparent from the evidence recorded that due importance is not being paid to their attachment to dynamos. This is also borne out by the results of a random check on No. 71 Down “Madras-Vijayawada Passenger” carried out by me on the 9th November—vide para 37 above. The evidence of the Electrical Examiner, New Delhi (vide para—27 above) is also revealing ; he stated that about 50% coaches that come out from ‘Shops’ do not have safety chains for the dynamos, and safety chains were not kept by them in stock.

This is a matter, it is felt, which should be pursued further, and the Railway Board should preferably issue definite orders on the subject—particularly as to whether a coach, which does not have safety chains attached to its dynamo, should be considered fit to run on a high speed train.

42. *Design of the dynamo pin*—The fastening of this pin at present is dependent solely on a split pin correctly functioning at either end. As mentioned in para-41 (a) above, the inner split pin cannot be examined unless some one gets right under the coach concerned. Further, the split pins themselves are not strong enough to with-stand lateral forces that might arise on the run due to extraneous causes.

It is considered, therefore, that the dynamo pin should be re-designed, with a head on the inside, and on the outside the fastening should be a split cotter of more robust design than the present split pin. This will also permit of easy examination of the outside split cotter by electrical train passing staff at intermediate stations.

VII. CONCLUSIONS

43. (a) From the evidence available I conclude that the derailment occurred as a result of the dynamo of the 1st coach becoming dislodged and falling off while the train was on the run. This dynamo was smashed in consequence, damaged the undergear of all the coaches passing over it, dislodged one of the vacuum chambers of the 5th coach, and eventually either the dynamo itself or the dislodged vacuum chamber formed an obstruction and brought about the derailment of the rearmost pair of wheels of the 5th coach.

The primary cause of the dynamo becoming dislodged was the failure of one of the split pins securing the dynamo pin to the undergear of the coach, and for this responsibility cannot be fixed on any individual.

(b) It is considered, however, that there has been slackness on the part of the primary maintenance depot electrical staff at Madras Central, and the secondary maintenance depot electrical staff at New Delhi which might have contributed to the failure of the split pin to some extent.

44. The relief arrangements were prompt and satisfactory.

Yours faithfully,
(Sd.) (H.S. Hart)

Bangalore-9,
9-1-1969,

Additional Commissioner of Railway Safety, Southern Circle,
Bangalore.

Recommendations & Incidental Observations and Recommendations made by the Commission of Railway Safety in connection with Derailment of No 52 Up Kazipet-Madras Express train between Duggirala and Tenali stations, South Central Railway, on 2nd November, 1968.

Recommendations :

1. The dynamo pin should be re-designed with a head on the inside and a more robust split cotter fastening on the outside.
2. Definite orders should be issued as to whether a coach which does not have safety chains attached to its dynamo should be permitted to run on a fast train.

Incidental Observations & Recommendations :

1. No. emergency tool box was apparently available with the Guard of the train. This should be looked into by the Railway Administration concerned.

2. Initially, when this accident occurred, the Additional Commissioner of Railway Safety was informed that the cost of damage to rolling stock was under Rs. 50,000/- and only one of the passengers had sustained a minor injury. Subsequently, a telegram was received by the Additional Commissioner of Railway Safety on the 7th November to the effect that the nature of injury sustained by the passenger had been re-classified as grievous. Such information could have easily been conveyed over the telephone on the 4th November, when an X-ray revealed the exact nature of the injury.

The Railway Administration should take care in future to ensure that such information is promptly conveyed over the telephone.

3. The flanges of the rearmost pair of wheels of the 5th coach of the train, which derailed, were deeply scored, which was rather surprising, considering that they had travelled for less than $\frac{1}{2}$ mile on ballast. The metallurgical and chemical composition of these flanges should preferably be checked up, as it is possible that they may have been made from softer steel than specified.

Railway Board have remarked as under on the above recommendations etc.

Recommendations :—

1. Accepted. The R.D.S.O. have been advised to issue necessary drawings to enable the Railways to carry out the modifications in the dynamo pins.

2. The matter has been examined by the Board who consider that it would not be practicable to issue orders that coaches without safety chains should not be permitted to run on fast trains.

Railways have, however, been advised to provide safety chains in such of those dynamos which are deficient of these by 1st June, 1969.

Incidental Observations & Recommendations

1&2. Suitable action has been taken by the Railway Administration in this regard.

3. A further communication would follow.